



DOCUMENT 555-07

RANGE OPERATIONS GROUP

**USER GUIDE FOR UNMANNED AERIAL SYSTEM (UAS) OPERATIONS
ON THE NATIONAL RANGES**

**WHITE SANDS MISSILE RANGE
REAGAN TEST SITE
YUMA PROVING GROUND
DUGWAY PROVING GROUND
ABERDEEN TEST CENTER
NATIONAL TRAINING CENTER
ELECTRONIC PROVING GROUND
HIGH ENERGY LASER SYSTEMS TEST FACILITY**

**NAVAL AIR WARFARE CENTER WEAPONS DIVISION, PT. MUGU
NAVAL AIR WARFARE CENTER WEAPONS DIVISION, CHINA LAKE
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION, PATUXENT RIVER
NAVAL UNDERSEA WARFARE CENTER DIVISION, NEWPORT
PACIFIC MISSILE RANGE FACILITY
NAVAL UNDERSEA WARFARE CENTER DIVISION, KEYPORT**

**30TH SPACE WING
45TH SPACE WING
AIR FORCE FLIGHT TEST CENTER
AIR ARMAMENT CENTER
ARNOLD ENGINEERING DEVELOPMENT CENTER
BARRY M. GOLDWATER RANGE**

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NEVADA)

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ON THE NATIONAL RANGES**

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Prepared by

RANGE OPERATIONS GROUP

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PREFACE

The Range Operations Group (ROG) of the Range Commanders Council (RCC) prepared this document. This document represents the cooperative effort of several RCC groups to define and develop a common set of guidelines for Unmanned Aerial System (UAS) operations and to assist Range users in obtaining approval to conduct UAS operations on the National Ranges. The information contained herein addresses general policy regarding operations, airspace, Range safety, and frequency management.

The goal of this document is to guide the Range user through the process to bring a UAS program onto a Range. The operation of UAS programs on the National Ranges, and their integration into day-to-day operations, present many unique challenges to customers and Range operators. While specific technical requirements may vary from Range to Range, many aspects of UAS operations are common.

The RCC gives acknowledgement for production of this document to key RCC Groups, including the Range Safety Group (RSG), the Range Airspace Group (RAG), and the Frequency Management Group (FMG). Special contributions were made by:

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NOTE For referenced documents, such as "RCC Document 501," the reader should refer to the most recently published document on the RCC web site. As of the publication date of this document (555-07), the reader would find that RCC Document 501-97 is the most recent version of Document 501.

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ACRONYMS

AFC	Area Frequency Coordinator
ATC	Air Traffic Control
COA	Certificate of Authorization
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
EA	Experimental Authority
EA	Environmental Assessment
EIS	Environmental Impact Statement
EL-CID	Equipment Location – Certification Information Database
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAD	Force/Activity Designator
FMG	Frequency Management Group
FTS	Flight Termination Systems
IAW	in accordance with
IFR	Instrument Flight Rules
MRTFB	Major Range and Test Facility Base
NAS	National Airspace System
NM	nautical mile
NTIA	National Telecommunications and Information Administration
PI	Program Introduction
PM	Program Manager
RAC	Risk Assessment Code
RAG	Range Airspace Group
RCC	Range Commanders Council
RDT&E	Research, Development, Test and Evaluation
Re-Rad	re-radiating
ROG	Range Operations Group
RSG	Range Safety Group
SUA	Special Use Airspace
UAS	Unmanned Aerial System
UDS	Universal Documentation System
UMMIPS	Uniform Materiel Movement and Issue Priority System
UND	Urgency of Need Designator
VFR	Visual Flight Rules

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CHAPTER 1

INTRODUCTION

1.1 Purpose

This document provides a common set of guidelines and information to assist Unmanned Aerial System (UAS) programs in obtaining approval to operate on the National Ranges.

1.2 Scope

The guidelines in this document are intended for use by customers of the Department of Defense (DoD) Ranges of the Major Range and Test Facility Base (MRTFB). The guidelines provide the Range customer with general information regarding national policy, RCC standards, and other areas of consideration related to UAS operations. It is important to remember that each Range operates as an individual entity with unique processes and procedures designed for specific missions. Therefore, some of the information provided herein may not apply at all Ranges.

1.3 Responsibilities

The DoD Directive 3200.11, Major Range and Test Facility Base, assigns responsibility to the individual Range Commanders to manage their activity, administer the operating program, obtain reimbursements from users, provide or arrange for test support and resources, and to ensure safety is consistent with operational requirements. The Commanders are the final authority with regard to approval of operations on their respective Ranges. In the case of programs that utilize multiple Ranges, the lead Range will ensure that all requirements of the lead Range and all supporting Ranges are met.

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CHAPTER 2

RANGE OPERATIONS

2.1 Requirements Definition

Early communications with a potential support Range is critical to the success of a test program. Initial contact with a Range is usually through informal means such as by telephone or e-mail; however, a detailed requirements definition must be documented and submitted through the Range's formal process. Although Range procedures and documentation formats differ within the DoD Major Range and Test Facility Base (MRTFB), the Program Introduction (PI) document is the initial planning document submitted by a user to the supporting agency. The user should immediately submit the PI or similar document upon identification of the scope and duration of a program activity. The user should provide the best available information so that the supporting agency can initiate thorough resource and technical planning actions. This information, while sometimes fragmentary and incomplete, is of substantial value to the support agency in determining the scope of the program. For many programs, the PI can eliminate further documentation except for conducting specific operations. While the PI can be submitted in a multitude of formats, the RCC Universal Documentation System (UDS) is expected to be used by all agencies desiring support from RCC member Ranges that have adopted the UDS. Requesting agency requirements documents and support agency response documents will be prepared in accordance with the format and procedures in the RCC Document 501, Universal Documentation System (UDS Handbook) and with those supplemental instructions prepared by the support agencies. A copy of the UDS is available online at the RCC public web site (<https://wsmrc2vger.wsmr.army.mil/rcc/index.htm>). The reader may gain further assistance by contacting the RCC Secretariat Office using the contact information at the [Preface](#).



In all cases, the customer should contact the Range to determine specific documentation requirements.

2.2 Security

The Unmanned Aerial System (UAS) presents many unique challenges to the supporting Ranges, including the critical challenge of security. These vehicles are equipped with a variety of sensors and systems making it possible for them to gather large volumes of information from their environment. The Ranges are unique national assets that support the Research, Development, Test and Evaluation (RDT&E) and training for our nation's most sophisticated and sensitive technologies. As such, it is critical that the Range security team and other Range customers have a full and complete understanding of UAS capabilities. While the disclosure of this information will normally be worked through the PI review process, it is recommended that a dialog with the Range security team start as early as possible (initial contact). Security issues, if not properly addressed, can limit scheduling opportunities and overall access to the Range.

2.3 Scheduling

Each MRTFB Range has developed its own scheduling system and processes. These systems vary from computer-based systems capable of automated resource de-confliction and schedule distribution to man-in-the-loop operations. Along with these processes, each Range has its own unique timelines for requirements submission and change management. As with security, the Range user should work with Range scheduling as early as possible to become familiar with the scheduling process. Programs planning to conduct multi-Range operations should work through the lead Range to determine what capability exists to develop an integrated schedule. All Range customers planning to use the DoD MRTFB should become familiar with DoD 4140.1-R, DoD Materiel Management Regulation, Appendix 9, Uniform Materiel Movement and Issue Priority System (UMMIPS). The Materiel Management Regulation designates priorities based on the following two factors:

- a. Force/Activity Designator (FAD) reflecting essentiality of program to the overall mission of DoD
- b. Urgency of Need Designator (UND) reflecting urgency of requisitioned item's use

The above factors can affect the availability of the Range to the customer and have a direct impact on mission success.

2.4 Environmental Management

The environmental management of military Ranges is becoming increasingly important in light of evolving regulations, facility closings, and readiness requirements for training and testing. Environmental Assessments (EA) and Environmental Impact Statements (EIS) are prepared to identify, consider, and resolve environmental problems early in the planning stages of a program. Both the EA and EIS are developed as planning documents to integrate environmental considerations into a Range's decision-making process. As with the other areas addressed in this document, UAS program personnel who are planning operations on the National Ranges must consider the impact on the environment and how their operations fit into the Ranges' existing environmental plan. Early contact with the Range's environmental planners will ensure the proposed operations fall within existing permits and allow sufficient time to resolve non-compliance issues. While environmental planning should be captured through the PI process, programs should be proactive in establishing communications with the Range environmental management team.

CHAPTER 3

RANGE SAFETY

3.1 Mission

The Ranges use a Range Safety Program to ensure that the testing and operation of all aircraft, including the Unmanned Aerial System (UAS) and their payloads, present no greater risk to the general public and non-mission essential personnel than that imposed by the over-flight of conventional aircraft. In addition to public protection, safety on a national Range includes test/training area safety and the protection of national resources.

Range Safety is intrinsic to the Range mission of providing Range users with the use of the facilities, instrumentation, and infrastructure to support vehicles and payloads during ground and flight operations. Some hazards and risks are inherent to UAS tests and operations; therefore, all reasonable precautions are to be taken to minimize these risks with respect to life, health, and property.

The objective of the Range Safety Program is to ensure that the general public, test/training area personnel, foreign land masses, and Range resources are provided an acceptable level of safety and that all aspects of UAS operations adhere to public laws and national needs. The mutual goal of the Ranges and Range users shall be to operate UAS and payloads safely and effectively with commitment to public safety.

Safety participation early in the planning stages of a program will reduce the possibility of costly engineering changes and/or scheduling delays. Therefore, coordination between the Range Safety Office and the Program Manager (PM) should be established as early as possible during the planning stages.

Range Safety personnel should be notified and be represented at all meetings where ground and flight safety issues are addressed. These meetings include:

- a. Technical interchange meetings
- b. Preliminary design reviews
- c. System design reviews
- d. Critical design reviews
- e. Flight readiness reviews

3.2 Risk

Safety is the responsibility of all Government personnel, contractors, tenants, experimenters, and Range users when conducting operations on the National Ranges or other off-Range locations. This requires a concerted effort by all personnel to operate in a manner that will minimize the risks inherent in performing operations. As a general policy, safety on the National Ranges will be maximized consistent with operational requirements. All Ranges strive to achieve complete containment of debris resulting from normal and malfunctioning vehicles and weapons. In most cases, however, a strict *risk avoidance* stance (reducing risk to the lowest possible level regardless of cost) would preclude many missions by making them too costly or unexecutable. However, if the risks associated with a planned mission cannot be controlled by containment, a risk management policy may be used if authorized by the Range Commander. *Risk management* is designed to meet standards of acceptable risk based on overall costs and benefits. Risk standards then can be used to derive safety requirements, and old requirements not needed to satisfy risk standards can be eliminated. The starting point for risk management on the National Ranges is RCC Document 321, Common Risk Criteria for National Test Ranges, Inert Debris, (and its Supplement). RCC Document 321 identifies the Range safety requirements established by DoD Directive (DoDD) 3200.11, Major Range and Test Facility Base, to insure that risks are controlled and minimized. Range users should contact the Range Safety Office to improve their understanding of how the Range's risk management practices apply to individual test programs.

3.3 Flight Termination Systems (FTS)

Depending on the potential risks associated with UAS operations, the Range may require the installation of an FTS on the vehicle. It is therefore essential that the program contact the responsible Range Safety Office as early as possible (during vehicle design phase is recommended) to determine what Range Safety systems will be required. Failure on the part of the program to plan effectively to meet Range safety requirements is not justification for waivers or deviations and can result in the program being delayed or denied the use of the Range. In an effort to establish a set of common design and testing requirements for programs operating on the National Ranges, the RCC member Ranges have set forth a Standard (RCC Document 319, Flight Termination System Commonality Standard) to assist the Range users in the development of an FTS. For purposes of this document, an FTS provides the necessary action to end the flight of a vehicle. The RCC FTS Committee has defined commonly acceptable FTS requirements for such systems in the various UAS categories. Requirements in the 319 Standard specify certain design features, documentation, system monitoring criteria, testing and in some cases, test methodology. The prospective Range user is encouraged to contact the Range for assistance in interpreting the RCC criteria and tailoring the Standard to the specific vehicle.

CHAPTER 4

AIRSPACE MANAGEMENT

4.1 General

Airspace is critical for Unmanned Air System (UAS) operations on DoD Ranges. There are many types of airspace designations, each having a unique purpose. The Federal Aviation Administration (FAA) is the controlling authority of the National Airspace System (NAS) and provides the DoD airspace to conduct military test and training missions. This airspace is categorized as Special Use Airspace (SUA) or Airspace for Special Use (ASU). Current FAA and DoD doctrine desires that UAS operations be confined within certain SUA, restricted areas, and warning areas; however, there are provisions to operate in most airspace as long as it safe and the proponent receives a Certificate of Authorization (COA) from the FAA.

4.2 Defining Airspace

When defining a section of airspace, there are four criteria to consider. These criteria are volume, proximity, time, and attributes.

- a. Volume. Volume is a key concept to understanding the amount of airspace actually required. The length and width of airspace are visible on a two-dimensional map, but the floor and ceiling must also be included to see the complete picture as airspace is always defined using three dimensions. This unique characteristic of airspace enables numerous users to operate safely at the same geographical location at the same time, but at different altitudes.
- b. Proximity. Airspace is often associated with a geographic area, airport, airfield, or military installation. Proximity affects the utility of the airspace and its use.
- c. Time. Airspace is allotted for use for a specific time period. Airspace designated for air-to-air training during a specific time may be subsequently used for air-to-ground gunnery when the next period begins.
- d. Attributes. Airspace attributes describe the physical characteristics or capabilities of the underlying surface that make certain sections of airspace unique. These attributes may be the type of terrain, instrumentation, chaff and flare approval, and target sets.

4.3 Restricted Areas

Restricted areas are established as areas where on-going and/or intermittent activities create unusual and often invisible hazards to non-participating aircraft. Examples of these activities include artillery firing, aerial gunnery, bomb dropping, and guided missile launches. Dimensions of the restricted area will vary depending on the test or training requirements and the risks to aircraft. Restricted areas have specific hours of activation, and entry during these hours requires specific permission from the FAA or a controlling agency of the Range. Restricted

areas are identified on sectional charts, Instrument Flight Rules (IFR) enroute charts, and terminal area charts. The floor and ceiling, operating hours, and controlling agency can be found on the charts. The Airspace Manager of the specific Range will be able to provide all the specifications of the airspace.

4.4 Warning Area

Warning areas contain the same hazardous flight activity as restricted areas but are located off shore over domestic and international waters. Warning areas normally begin three nautical miles (NM) from the shoreline, but areas created since 1988 begin at 12 NM. Warning areas overlying the territorial waters of the United States are under the FAA jurisdiction. The controlling agency may be the FAA or a designated military unit. Since Visual Flight Rules (VFR) operations are permitted in warning areas, the FAA does not guarantee traffic separation. Warning areas are charted on sectional charts, IFR enroute charts, and terminal area charts. The floor and ceiling, operating hours and controlling agency can be found on the charts. The Range specific Airspace Manager will be able to provide all the specifications of the airspace.

4.5 Certificate of Authorization (COA)

The FAA has provisions that, with an approved COA, UAS flights are allowed outside restricted or warning areas. The COA request procedures are codified in FAA Order 7610.4. The procedures are currently superseded by a policy letter until 7610.4 is rewritten and published. The Airspace Manager for each DoD Range can assist any proponent in applying for a COA to operate an UAS in the NAS. A proponent is any federal agency actively engaged in or sponsoring UAS operations and willing to assume the risk for said operations. The FAA policy general conditions and limitations include:

- a. Definitions
- b. Airworthiness certification
- c. Chase aircraft
- d. Communications
- e. Dropping objects/Hazardous material
- f. Flight above FL180
- g. Flight below FL180
- h. Flight over congested areas
- i. Lost link
- j. Onboard cameras/sensors
- k. Pilot/observer medical standards
- l. Pilot qualifications
- m. Pilot responsibilities
- n. Pilot/observer limitations
- o. Observer qualifications and responsibilities

4.6 Questions About Airspace

Questions about airspace at any DoD Range or MRTFB can be answered by the Airspace Manager at the specific Range. Information on Airspace Management Offices and other contact information for RCC member and associate Ranges can be found in Appendix [A](#).

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CHAPTER 5

FREQUENCY MANAGEMENT: UAS SPECTRUM UTILIZATION AT DoD TEST AND TRAINING RANGES

5.1 General

There is a two step documentation process for obtaining access to the DoD frequency spectrum. The first step refers to a Spectrum Certification, also called a Frequency Allocation. The second step, known as a Frequency Assignment, refers to the approval to radiate at specific locations.

5.2 System Certification

The certification/allocation process involves comparison of new transmitters, receivers, and antenna information to existing standards for Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) analyses with other DoD systems operating in the same portion of spectrum. The certification process is a risk reduction process that helps the Program Manager avoid development delays by focusing program funding on a specific portion of the spectrum. This process is currently an electronic document process using DD Form 1494, Application for Equipment Frequency Allocation. This process is transitioning to a computer automated process known as Equipment Location-Certification Information Database (EL-CID). Depending on the UAS system, spectrum compatibility, restrictions, and requested location, this process can take up to two or more years to complete.

5.3 Frequency Assignment

The purpose of the frequency assignment process is to obtain approval to turn on the transmitter at specific locations, under specific operational restrictions. The requests for frequency assignments are processed through a computer database management system known as Spectrum XXI (21). Depending on the UAS system, this process can take up to 120 days to obtain approvals for compatibility, restrictions, and requested location.

5.4 Experimental Authority (EA)

At some Range locations, the approval to radiate one time for a short duration can be granted under an EA in order to complete pre-production testing. Procedures for this approval are contained in the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management. This process requires coordination with the responsible Area Frequency Coordinator (AFC) and an approved temporary frequency assignment. This process can take up to thirty (30) days depending on the UAS system, compatibility, duration, restrictions, and location.

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REFERENCES

The references shown below refer to various documents and standards applied to Unmanned Aerial System (UAS) operations within DoD, the National Ranges, and the National Airspace System (NAS). These references define the compliance processes and procedures for which a program may be held accountable, depending on individual Range policies. Each program should contact the individual Range points of contact to determine applicability. The references identify applicable RCC Standards, national standards, and other pertinent documents

1.1 Range Operations

- a. DoDD 3200.11, Major Range and Test Facility Base
- b. DoD 4140.1-R, DoD Materiel Management Regulation, Appendix 9, Uniform Materiel Movement and Issue Priority System (UMMIPS)
- c. DoDD 3200.15, Sustainment of Ranges and Operating Areas (OPAREAS)
- d. DoDD 4715.1, Environmental Security
- e. AFI 13-212, Range Operations and Planning

1.2 Range Safety

- a. RCC 323-99, Range Safety Criteria for Unmanned Air Vehicles
- b. RCC 319-07, Flight Termination System Requirements
- c. RCC 313-01, Test Standards for Flight Termination Receivers/Decoders
- d. RCC 321-07, Common Risk Criteria for the National Ranges

1.3 Airspace Management

- a. FAA Order 7610.4, Special Military Operations
- b. FAA AFS 400 UAS Policy Letter
- c. AFI 13-201, Air Force Airspace Management
- d. AR 95-1, US Army Flight Operations
- e. AR 95-23, US Army UAV Operations
- f. OPNAV INST 3770.2

1.4 Frequency Management

- a. DoDI 4650.01, Policy for Management and Use of the Electromagnetic Spectrum
- b. DoDD 5144.1, Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer (ASD(NII)/DoD CIO)
- c. Section 305 and Chapter 8 of title 47, United States Code Office of Management and Budget (OMB), Circular A-11, Part 2 (as amended)
- d. Title 47, Code of Federal Regulations, Chapter III, Part 300, U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA), "Manual of Regulations and Procedures for Federal Radio Frequency Management," as amended, current edition

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APPENDIX A

POINTS OF CONTACT

1.1 Range Operations

<u>RANGE</u>	<u>LOCATION</u>	<u>OFFICE</u>	<u>PHONE</u>
30 Space Wing	Vandenberg AFB, CA	2 ROPS/DO	805 606-3602
45 Space Wing	Patrick AFB, FL	45 RANS/DOUX	321 853-8259
Aberdeen Test Center	Aberdeen Proving Ground, MD	CSTE-DTC-AT-PO-R	410 278-2215
Air Armament Center	Eglin AFB, FL	46 RANS/CA	850 882-4039
Air Force Flight Test Center	Edwards AFB, CA	412RANS/DO	661 277-2727
Barry M Goldwater Range	Luke AFB, AZ	56 RMO/DO	623 856-8790
Electronic Proving Ground	Fort Huachuca, AZ	CSTE-DTC-EP-TR	520 533-8130
NAVAIR	China Lake, CA	Code 52131MD	760 939-6019
NAVAIR	Point Mugu, CA	Code 521A00E	805 989-8953
NAVAIR	Patuxent River, MD	Code 5.2.2	301 342-6016
Pacific Missile Range	Barking Sands, HI	Code 7333	808 335-4802
White Sands Missile Range	White Sands, NM	CSTE-DTC-WS-TC-RO-CE	505 678-8613
Yuma Proving Ground	Yuma, AZ	CSTE-DTC-YP-I	928 328-2862
Dept. of Energy	Las Vegas, NV	Nevada Test Site Office	702 295-4015

1.2 Range Safety

<u>RANGE</u>	<u>LOCATION</u>	<u>OFFICE</u>	<u>PHONE</u>
30 Space Wing	Vandenberg AFB, CA	30 SW/SEY	805 605-8778
45 Space Wing	Patrick AFB, FL	45 SW/SEOO	321 494-5101
Aberdeen Test Center	Aberdeen Proving, MD	CSTE-DTC-AT-PO-R	410 278-2215
Air Armament Center	Eglin AFB, FL	AAC/SEU	850 882-7341
Air Force Flight Test Center	Edwards AFB, CA	412RANS/ENROR	661 277-3224
Barry M Goldwater Range	Luke AFB, AZ	56 RMO/ARO	623 856-8813
Electronic Proving Ground	Fort Huachuca, AZ	CSTE-DTC-EP-SE	520 533-8072
NAVAIR	China Lake, CA	Code 52330MD	760 939-6781
NAVAIR	Point Mugu, CA	Code 52330ME	805 989-5676
NAVAIR	Patuxent River, MD	Code 5.2.2.G	301 342-1184
Pacific Missile Range	Barking Sands, HI	Code 7331	808 335-4466
White Sands Missile Range	White Sands, NM	CSTE-DTC-WS-TC-RO-CF	505 678-0211
Yuma Proving Ground	Yuma, AZ	CSTE-DTC-YP-YT-DS	928 328-3264
Dept. of Energy	Las Vegas, NV	Nevada Test Site Office	702 295-4015
Reagan Test Site	USAFA	SMDC-RD-TE-K-ZS	805 355-1516

1.3 Airspace Management

<u>RANGE</u>	<u>LOCATION</u>	<u>OFFICE</u>	<u>PHONE</u>
30 Space Wing	Vandenberg AFB, CA	2 ROPS/DON	805 606-3602
45 Space Wing	Patrick AFB, FL	1 ROPS/DOOS	321 853-5936
Aberdeen Test Center	Aberdeen Proving, MD	CSTE-DTC-AT-PO-R	410 279-2215
Air Armament Center	Eglin AFB, FL	46 OSS/OSX	850 882-6150
Air Force Flight Test Center	Edwards AFB, CA	412 OSS/	661 277-2446
Barry M Goldwater Range	Luke AFB, AZ	56 FW/ASM	623 856-5855
Electronic Proving Ground	Fort Huachuca, AZ	CSTE-DTC-EP-TR	520 533-8089
MCB Quantico	MCB Quantico, VA	Code C465	703 784-6726
MAGTF-TCT	Twenty-Nine Palms, CA	Ops & Tng Directorate	760 830-6945
Marine Corp Installations West	San Diego, CA	Rng & Airspace Cord	760 763-6405
National Training Center	Ft Irwin, CA	AFZJ-PTA	760 380-5606
NAVAIR	China Lake, CA	Code 523700D	760 939-5071
NAVAIR	Point Mugu, CA	Code 52R000E	760 939-5071
NAVAIR	Patuxent River, MD	Code 0428A	301 342-3339
Nellis Test & Training Range	Nellis AFB, NV	57 OSS/OSM	702 652-7891
Pacific Missile Range	Barking Sands, HI	Code 7331	808 325-4201
White Sands Missile Range	White Sands, NM	RO-CR	505 678-4087
Yuma Proving Ground	Yuma, AZ	CSTE-DTC-YP-R	928 328-6125

1.4 Frequency Management

<u>RANGE</u>	<u>LOCATION</u>	<u>OFFICE</u>	<u>PHONE</u>
30 Space Wing	Vandenberg AFB, CA	30 SCS/SCMI	850 606-7653
45 Space Wing	Patrick AFB, FL	45 SCS/SCXF	312 494-8715
Aberdeen Test Center	Aberdeen Proving, MD	CSTE-DTC-AT-FF-I	410 278-4116
AEDC	Arnold AFB, TN	AEDC/PWCS	931 454-4727
Air Armament Center	Eglin AFB, FL	96 CG/SCWF	850 882-4202
Air Force Flight Test Center	Edwards AFB, CA	95 CS/SCMFS	661 277-8879
Army Test Center	Aberdeen, MD	CSTE-DTC-AT-FF-I	410 278-9464
Barry M. Goldwater Range	Luke AFB, AZ	56 CS/SCMF	623 856-6094
Electronic Proving Ground	Fort Huachuca, AZ	CSTE-DTC-EP-TR	520 533-8018
MCB Twenty Nine Palms	Twenty-Nine Palms, CA	MAGCC	760 830-7179
National Training Center (USA)	Ft Irwin, CA	AFZJ-PTS	760 380-6171
NAVAIR	China Lake, CA	Code 523130D	760 939-6088
NAVAIR	Point Mugu, CA	Code 521700E	805 989-1088
NAVAIR	Patuxent River, MD	NAVAIRWARCENACDIV	301 342-1200
Naval Undersea Warfare Center	West Palm Beach, FL	AUTEC Det Code 73	56) 832-8566
Naval Surface Warfare Center	Fallon, NV	Code FT-22	775 426-3778
Nellis Test & Training Range	Nellis AFB, NV	98 RANS/RSC	702 653-5259
Nevada Test Site	Las Vegas, NV	DOE	702 295-4766
Pacific Missile Range	Barking Sands, HI	Code 7325	315 471-6980
UTTR	Hill AFB, UT	75th CS	801 777-3606
White Sands Missile Range	White Sands, NM	CSTE-DTC-WS-TC-IO-MP	505 678-4945
NASA/DFRC	Edwards, CA	Code M, M/S 2516F	661 276-2138
NASA/GSFC	Greenbelt, MD	Code 450	301 286-5089
NASA/KSC	Kennedy, FL	Code TA-B2	321 867-8540
NASA/WFF	Wallop Island, VA	Code 565	757 824-1623
Yuma Proving Ground	Yuma, AZ	CSTE-DTC-YP-YT-IM	928 328-7070

1.5 Area Frequency Coordinators

<u>RANGE</u>	<u>LOCATION</u>	<u>OFFICE</u>	<u>PHONE</u>
Arizona	Fort Huachuca, AZ	-	520 538-6423
Nellis	Nellis AFB, NV	-	702 652-3417
Western (WAFC)	Point Mugu, CA	-	805 989-5601
White Sands Msl Range (WSMR)	White Sands Missile Range, NM	-	505 678-5417

NOTE



A complete list of Area Frequency Coordinators is maintained in Annex D of the National Telecommunications and Information Agency (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management, the "NTIA Redbook." The NTIA Redbook is available from the Department of Commerce, NTIA, Office of Spectrum Management at <http://www.ntia.doc.gov/osmhome/redbook/redbook.html>.

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APPENDIX B

FREQUENCY MANAGEMENT CHECKLIST

The following is a combined list of common questions asked by all Range Frequency Managers. The Program Manager (PM) of an Unmanned Aerial System (UAS) should be prepared to answer these questions and to provide other relevant information.



NOTE

There are Range-specific questions that are not contained in the list shown below. Unanswered questions (or unknown questions) may adversely impact the UAS test or training schedule. Therefore, the local Range Frequency Manager should be consulted for additional information and the requirements for testing at a specific Range.

1.1 General Contact Information

- a. Is this a DoD or commercial UAS test or training program?
- b. Who is the PM for this test or training?
- c. What is the PM Contact Information (organizational address, telephone, and E-mail)?

1.2 Certification Allocation Process

- a. Has the UAS been granted Spectrum Certification? Please provide the assigned JF-12 Number.
- b. Have you gathered the DD Form 1494 data Information?
- c. Is the information provided calculated or measured data?
- d. Is the UAS in its Conceptual or initial planning stage?
- e. Is the UAS in its Experimental or still under preliminary design?
- f. Is the UAS in its Development, pre-production and major design complete or testing still required?
- g. Are the operational constraints and restrictions identified?
- h. Are there any new modifications made to the UAS since certification was approved?

1.3 Frequency Assignment Process

- a. Do have a Frequency Assignment?
- b. What is the Agency Serial Number?
- c. Has a frequency assignment proposal been submitted?
- d. Has a temporary frequency proposal been submitted?
- e. What are transmitters tuning Ranges?
- f. What is the power in watts of each transmitter?
- g. What is the bandwidth of each transmitter?
- h. What is the modulation of each transmitter?

1.4 Operational requirements/Constraints/Restrictions

- a. Does your UAS require use of a Flight Termination System?
- b. Are you aware your UAS availability to access spectrum is based upon current Range operations and your specific activity will require scheduling coordination with other Range operations?
- c. Are there any air space or altitude requirements or restrictions?
- d. Are there any requirements or restrictions to Day / Night / Both operations?
- e. What is the estimated total number of flights planned?
- f. What is the estimated duration of each flight?
- g. Are there any satellite communications required to support your UAS?
- h. Are there any operational security issues?
- i. Are there any weather restrictions imposed on your UAS operations?
- j. Are there any new sensors, electronic attack, or weapons on board the UAS?
- k. Does the UAS contain any GPS jamming or GPS re-radiating (Re-Rad) capability?
- l. Is any UAS video capability being used during the test or training?
- m. Is there any on-board UAS data storage capability?

GLOSSARY

Acceptable Risk: A predetermined criterion or standard for a maximum risk ceiling which permits the evaluation of cost, national priority interests, and number of tests to be conducted.

General Public: All people not declared mission essential. This includes the public plus Range personnel not essential to a mission, visitors, the press, and personnel or dependents living on the base or facility.

Hazard: Any real or potential condition that can cause injury, illness, or death of personnel, or damage to or loss of equipment or property.

Hazard Area: A geographical or geometrical surface area that is susceptible to a hazard from a planned event or unplanned malfunction.

Individual Risk: The risk to a single person.

Mission Essential: Those personnel, aircraft, and ships whose activities are directly relevant to the mission or are declared essential by the safety decision-making authority.

Restricted Airspace: Restricted Area - airspace designated under 14 CFR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) operations in the area may be authorized by the controlling Air Traffic Control (ATC) facility when the area is not being utilized by the using agency. Restricted areas are depicted on enroute charts. When the joint use is authorized, the name of the ATC controlling facility is also shown.

Risk: A measure that considers both the probability of occurrence and the consequence of a hazard. For this document, risk is expressed in terms of probability of fatality and expected fatalities.